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published in
Quality and Quantity
1999

DOI (link to publisher)
10.1023/A:1026473714245

document version
Publisher's PDF, also known as Version of record

Quality & Quantity **33:** 157–168, 1999.

Measuring Career Mobility: An Empirical Comparison of Six Mobility Indexes

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Abstract. The current paper presents six indexes that can be used to characterize the course of a career during a particular time interval, respectively, (1) the total number of transitions during that interval; (2) the number of positive transitions; (3) the number of negative transitions; (4) the subtraction of the number of negative transitions from the number of positive transitions; (5) the relative uncommonness of the transitions; and (6) the subtraction of the number of negative transitions from the number of positive transitions, weighted by their uncommonness. Advantages and disadvantages of these six indexes are discussed. Further, an empirical example is presented that draws on data from a sample of 357 employed Dutch youth. Finally, our approach is compared to previous approaches (event-centered methods, such as survival analysis, and career-centered methods, such as clustering techniques). It is concluded that our simple approach complements these other approaches well.

Key words: longitudinal data analysis, event history data, career development.

The last two decades have witnessed a rapid increase in the interest in longitudinal data collection and analysis (Dijkstra & Taris, 1995). The data often take the form of *event histories* (e.g., Blossfeld, Hamerle & Mayer, 1989; Yamaguchi, 1994), consisting of sequences of states occupied by the sampling units during a particular observation period, as well as the timing of transitions from one state to another (e.g., from married to unmarried, or vice versa). Although event history data can be collected on many topics and for many types of sampling units (e.g., persons, business firms, research projects), for simplicity we refer only to event histories of natural persons.

As regards the analysis of event history-data, one may distinguish between *event-centered* and *career-centered* methods. In event-centered analysis, researchers focus on the occurrence and recurrence of one particular type of event, e.g., from employment to unemployment, from married to single, etc. The sequence of transitions is conveniently split in its constituent episodes, during which the person belonged to the state of interest. Two typical modes of analysis are survival analysis

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and related methods (in which the duration of belonging to a particular state is the dependent variable; cf. Tuma & Hannan, 1984; Blossfeld et al., 1989, for discussions), and regression-like methods (in which the dependent variable represents the occurrence of a particular transition during the observed period; e.g., whether an unemployed person has found a job within, say, two years after the first wave of the study). Although this mode of analysis is relatively simple and conceptually unambiguous (results can easily be related to substantive research questions, typically questions like "which factors determine the occurrence of event X?"), it neglects the fact that a particular sequence may contain more than a single event of a particular kind. Further, it may be of theoretical importance to examine the course of the career as a whole, rather than as a more or less random sequence of presumedly isolated events (cf. Rosenbaum, 1979).

Career-centered modes of analysis were developed to examine the course of careers, taken *as wholes*, during a particular time period. Several transitions may occur within this time period, and these are all included in the analysis (cf. Abbott & Hrycak, 1990; Dijkstra & Taris, 1995). This mode of analysis typically results in more or less complex qualitative classifications of careers (but see Taris & Bok, 1994; Van der Heijden & De Leeuw, 1989). The drawbacks of this mode of analysis are twofold. First, it is often difficult – if not impossible – to link the classification to other variables, as nonstandard software packages are needed to create the classification. More importantly, as empirical differences among careers are not necessarily also of substantive interest, it can be rather difficult to interpret the differences among classes of careers in the light of the substantive research question.

The first part of this paper deals with simple ways to characterize the course of a career during a particular interval. They highlight different aspects of career development; some focus on the amount of change, others on the degree to which there is upward or downward change, yet others on the uncommonness of particular changes. Some of them are old and well-used, whereas others are new and have, to our knowledge, not previously been employed. As the choice for a particular approach must be based on theoretical considerations, the results can usually easily be interpreted in the light of the research question of interest. As such, they combine some of the virtues of event- and career-based approaches discussed earlier. The second part of this paper presents a small example that illustrates the issues considered in the first part of this paper. Finally, advantages and limitations of our approach are discussed in relation to traditional event- and career-centered approaches.

1. Measuring Career Mobility

A quick glance at the literature on mobility in different substantive domains reveals that no single method of measuring mobility is generally preferred to other methods. That may in itself not be surprising, but what is interesting – and, perhaps,

disquieting – is that the choice for a particular operationalization is almost never explicitly addressed. Indeed, the choice for a particular approach of measuring mobility often seems more a matter of convenience, than the result of a conscious contemplation of the reasons why one particular way of measuring career development should be preferred to another.

Generally speaking, measures of career mobility differ with respect to two dimensions, namely whether they include evaluative judgments about the nature of transitions (valence; e.g., in terms of "good" vs "bad", or "upward" vs "downward" transitions), and whether they focus on the absolute vs the relative amount of change. As regards the *valence* of transitions, some approaches do not distinguish among different types of transitions. As an example we cite the common practice in longitudinal research of measuring job turnover in terms of a dichotomous variable indicating whether a particular person has found a different job. It is, however, often of interest to see whether this was a voluntary or an involuntary (or: a downward vs an upward) transition, as involuntary job changes are probably caused by a different set of factors and have different implications than voluntary changes.

Insofar as this distinction involves subjective judgments about the nature of particular transitions, it may be subject to criticism. Often an external criterion is needed to judge the valence of a particular transition. However, as the choice of such a criterion depends on the theoretical framework adopted in the study, it may well be subject to criticism. For example, a transition to a higher-level job (usually a positive transition) often brings about increased work stress and lower well-being. Thus, from a different point of view this transition could well be considered negative.

Absolute vs relative frequency. It is often quite convenient to focus on the absolute amount of change in a career trajectory, that is, to count the number of transitions that have occurred (possibly with constraints regarding the type of transitions that are of interest, e.g., downward vs. upward transitions). The amount of change $C(x)$ in a particular career trajectory x may be computed as

$$C(x) = \left(\sum_{t_{ijx}} | t_{ij} \in T \right), \tag{1}$$

where t_{ij} indicates a transition from state s_i at time i to state s_j at time j, and T is a pool of transition types that are considered of interest. $C(x)$ may take on different meanings, depending on the definition of T. For example, if T includes all transitions in a particular career trajectory, $C(x)$ indicates the amount of change in a career. However, if T is defined as the pool of positive (negative) transitions, $C(x)$ may be taken as an indicator of upward (downward) mobility – although it is probably better to devise an indicator in which positive (upward) transitions and negative (downward) transitions can compensate each other. For example, if a career trajectory includes two positive transitions followed by five negative transitions, it seems unreasonable to speak of an "upward" employment career,

as the number of upward transitions is more than compensated by the number of downward transitions.

This way of measuring change simply tells us what *is*, that is, how often particular events occur in a career trajectory; they do not inform us how a particular trajectory compares to other trajectories. However, this may be of considerable interest. Spencer and McCall (1982) define " ... order-disorder [...] as the extent to which the career approximates the normative pattern implied in a career line for the number and timing of job changes. If a given manager is late in making a particular job transition that many of his or her counterpart managers have made by the same age, then there is some degree of disorder because the career departs from the career line" (p. 22). What matters in this approach is not so much *whether* one has made a particular transition or *how many* transitions one has experienced, but rather how a particular transition fits in the normative career trajectory that applies for this particular person. That is, career development might be studied in relation to the typical careers experienced by contemporaries. This line of reasoning suggests that one potentially fruitful conceptualisation of career mobility examines the degree to which particular transitions are "common" or "uncommon", relative to the careers of comparable others.

One approach to measuring the uncommonness of a particular career trajectory is to compute the relative uncommonness of the transitions included in this trajectory. An often-occurring transition would receive a low weight, while infrequently occurring transitions would be weighted heavily (cf. Abbott & Hrycak, 1990, for a similar approach). The uncommonness UNC(x) of a particular career trajectory can then be computed as

$$\mathrm{UNC}(x) = \left(\sum_i \sum_j t_{ijx} w_{ij} | t_{ij} \in T \right), \tag{2}$$

where t_{ij} is the number of transitions of state s_i at time i to state s_j at time j, and w_{ij} is the weight associated with this transition. Abbott and Hrycak (1990) suggest that the transitions t_{ij} be weighted by their relative frequency of occurrence (see example below). This way of constructing weights is based on the information in the careers themselves; no subjective judgments of the valence of events are needed. Hence, the methodological problems with regard to using an external criterion do not apply. Evaluations of particular events can be included, however, by modification of the weights w_{ij}.

Summarizing, career mobility can be measured in a number of ways. Different ways of measuring career mobility highlight different aspects of mobility; some emphasize the absolute amount of change, whereas others focus on the uncommonness of the transitions that constitute the career trajectory. Moreover, approaches differ with regard to whether they consider the valence of transitions. This also implies that the choice for a particular approach should be contingent on

one's theoretical framework; the theoretical meaning of approaches may be very different.

2. Illustration: Sensation Seeking, Job Characteristics and Mobility

The notions discussed above are illustrated in a four-year longitudinal study on the effects of a personality construct (two scales of Zuckerman's, 1994, sensation seeking) on the career mobility of employed young Dutch adults. Sensation seekers value varied, novel, complex and intense sensations and experiences, and they are willing to take physical and social risks for the sake of such experiences (Zuckerman, 1994). Being a sensation seeker may have implications for the development of one's employment career, for at least three reasons. First, sensation seekers are attracted to risky vocations and jobs that offer varied and interesting activities (Zuckerman, 1994). Secondly, sensation seekers will feel bored more quickly than others, and therefore they will tend to change jobs more often than others. Finally, particular pathological manifestations of the sensation seeking trait (such as impulsive personality disorders, antisocial tendencies, excessive use of alcohol, substance abuse, absenteeism) may interfere with work behavior and career development.

In examining the effects of sensation seeking on the development of the employment career, one may focus on very different aspects of career development. First, one may emphasize *absolute* change – sensation seekers will experience more change than others. One may also consider *relative* change – sensation seekers will experience more uncommon transitions than others. Further, sensation seekers might experience relatively many *negative* transitions (transitions to a lower-level job, long-term unemployment), as substance abuse, absenteeism and the like tend to affect the quality of the employer-employee relationship. In accordance with these ideas, six mobility indexes highlighting different aspects of the course of a career during the observed four-year interval were created. These were (1) the total number of transitions during that interval; (2) the number of positive transitions; (3) the number of negative transitions; (4) the subtraction of the number of negative transitions from the number of positive transitions; (5) the relative uncommonness of the transitions; and (6) the subtraction of the number of negative transitions from the number of positive transitions, weighted by their uncommonness.

The six mobility indexes served as dependent variables in a structural equation model. Explanatory variables included characteristics of the first job the participants had ever held (including job level, and appointment type; we expected that these attributes would affect the employment career, as it is relatively difficult to improve on a "good" job – leading to lower career mobility), and personal characteristics (sensation seeking, level of education, amount of labor market experience, and gender). Of these variables, only sensation seeking is of substantive interest; the other variables were merely included as controls.

Table I. Description of the construction of the career indexes

Transitions	(1) X	(2) SD	(3) Total	(4) Valence	(5) Relative frequency of occurrence (x)	(6) Weight ($1/x$)	(7) Weight x valence
(1) < 2 months unemployed	1.16	1.70	515		0.60	1.67	1.67
(2) 3–11 months unemployed	0.41	0.97	208	–	0.24	4.17	−4.17
(3) 12 > months unemployed	1.06	0.72	134	–	0.16	6.25	−6.25
Total			857				
(4) Higher-level job	0.67	0.77	215		0.25	4.00	4.00
(5) Same-level job	1.59	1.62	519		0.61	1.64	1.64
(6) Lower-level job	0.38	0.64	123	–	0.14	7.14	−7.14
Total			857				

Data. The data were collected in a two-wave panel study among a representative sample of 357 employed Dutch adults, all born in 1961, who were interviewed during fall-winter 1987–1988. Details of the sampling procedure, nonresponse, et cetera are given by Feij and Taris (1998). All participants completed a self-report questionnaire measuring personality and background variables. Additionally, they were personally interviewed about their attitudes, opinions and behavior with respect to several life domains. The second wave was conducted four years later (1991/92). At both waves information was retrospectively collected about the number, nature and timing of changes on the life domains examined in the study, including the employment career. This allowed us to create a precise record of the course of events on these domains. The six mobility indexes were created on the basis of the information presented in Table I.

Each empirically occurring transition towards a new job yielded two separate pieces of information. One of these pertained to the *length of the unemployment episode* separating two jobs. We distinguished among a (very) short, a moderately long, or a long period of unemployment (events 1 to 3 in Table I). Experiencing a moderately long (3–11 months) or long period of unemployment (more than 12 months) was considered a negative event (column 4 in Table I), whereas experiencing a (very) short period of unemployment (less than 2 months) was considered a positive event. The other piece of information concerned the *level of the new job*, compared to the previous job. One could find a a higher level, same level, or lower

level job compared to the previous job (events 4 to 6). As Table I shows, finding a same-level or higher-level job was considered a positive event; a transition towards a lower-level job was considered negative.

Further, Table I presents the average rate of occurrence of each transition per career trajectory, together with the corresponding standard deviations (columns 1 and 2, respectively); the number of times a particular transition occurred (summed across all career trajectories, column 3); the relative rate of occurrence (x) of each particular episode, i.e., the frequency presented in column 3 divided by the total number of empirically occurring transitions (857); the weight associated with each transition (following Abbott & Hrycak, 1990, computed as $1/x$, column 6); and weight times the valence of the transition (column 7). For instance, our participants contributed 857 transitions in total. Of these, 134 (16%) were preceded by a period of long-term unemployment. Multiplication of this proportion by $1/x$ yields a weight of 6.25, meaning that experiencing a period of long-term unemployment is quite uncommon. On the basis of this information, six indexes were computed. Four of these were based on the absolute frequency of occurrence of (particular sets of) transitions, whereas the remaining two emphasized the relative frequency of occurrence of the transitions.

Absolute frequency measures. For each participant, the *total number of transitions* (TnT) was computed using Equation (1). As the focus is on the total number of transitions, T includes *all* transitions included in a particular participant's event history (cf. Table I). Thus, TnT is a simple measure of the absolute amount of change in a particular career trajectory.

The domain of T can be constrained to include only positive or negative transitions. The *total number of positive transitions* (TnP) was computed using Equation (1), but now the pool of transitions of interest T only included positive transitions (Table I). In a similar vein, Equation (1) was used to compute the *total number of negative transitions* (TnN), by letting T include only negative transitions. TnP and TnN might be considered indexes that represent the amount of upward (downward) mobility that a particular career trajectory contains. As noted earlier, a good indicator of upward (downward) career mobility requires that upward and downward transitions are allowed to "compensate" each other. Thus, a fourth index *Career Progression* (CPR) was computed as the number of positive transitions TnP minus the number of negative transitions TnN. CPR represents the overall progression of the career during the observed interval, in that positive and negative events may compensate each other. As such, it is a better measure of upward (downward) career mobility than either TnP or TnN.

Relative frequency measures. The *uncommonness* (UNC) of the career trajectories was computed using Equation (2). Following Abbott and Hrycak (1990), the transitions t_{ij} were weighted by their relative frequency of occurrence. First we constructed a transition matrix that presented the likelihood of a transition from state s_i to state s_j, irrespective of the timing of these transitions. The proportions in the transition matrix were then turned into weights by taking their inverse, yielding

Table II. Intercorrelations, means and standard deviations of the six mobility indexes

Mobility indexes	(1)	(2)	(3)	(4)	(5)	(6)	*X*	SD
(1) Total number of transitions (TnT)	1						5.25	4.15
(2) Total number of positive transitions (TnP)	0.94	1					3.40	3.30
(3) Total number of negative transitions (TnN)	0.69	0.39	1				1.84	1.55
(4) Career progression (CPR)	0.65	0.88	−0.11	1			1.56	3.07
(5) Uncommonness career (UNC)	0.92	0.75	0.88	0.34	1		18.18	12.89
(6) Weighted career progression (WCP)	0.00	0.34	−0.71	0.74	−0.33	1	−3.84	8.32

NB. Correlations over 0.10 and over significant at $p < 0.05$, $N = 357$.

a weight matrix in which frequently occurring transitions received small weights, whereas uncommon transitions received large weights (cf. Table I).

Finally, a particular direction was assigned to the weights derived for the mean uncommonness of a career, yielding the Weighted Career Progression (WCP). For example, the uncommonness of a transition from employment to a lower level job was 7.14; this particular transition was considered negative. Hence, the contribution of any such transition to the weighted mean progression of a career was −7.14.

Table II presents the means, standard deviations, and intercorrelations among the six mobility indexes. As this table shows, the correlations among some of the indexes were very high. For example, the total number if transitions TnT correlated 0.94 with the number of positive transitions TnP, which was due to the fact that the participants experienced on average more positive transitions than negative transitions (cf. Table I). Similarly, the high correlation between TnT and CPR (of 0.88) suggests that participants who experienced many transitions experienced many uncommon transitions as well.

Sensation seeking. Two dimensions of the sensation seeking construct (Zuckerman, 1994) were employed in this study (Van den Berg & Feij, 1988). The first was a six-item *Disinhibition* scale, with typical items being "I feel good after a couple of drinks", "sometimes I need to act out", and "I like wild parties" (α = 0.78). The second scale was a six-item *Boredom Susceptibility* scale, including items such as "I lose interest quickly if people or things around me remain the same", "uncommon events provide me with the excitement I need", and "I would like to have a job requiring travelling around the world" (α = 0.68). All items in these scales employed a seven-point response format (1 = "strongly disagree", 7 = "strongly agree"). For theoretical as well as empirical reasons (the correlation

between the subscales was 0.47, $p < 0.01$), the scores on these scales were taken as indicators of a latent trait "sensation seeking".

Other variables. All participants were asked to indicate for the first job they had held whether that had been a *permanent position*. The *level of the first job* was rated on a six-point scale, ranging from 1 (low level job) to 6 (high level job). *Level of education* was measured on a nine-point scale. *Amount of labor market experience* was measured as the time elapsed since the start of the first job. Finally, *gender* was included in the analyses.

Results. The data were analyzed using covariance structure modeling (Jöreskog & Sörbom, 1993). All six mobility indexes were analyzed in the same analysis. As the skewnesses of the mobility indexes were often quite high (ranging from 0.85 to 5.10), log-transformed variables were analyzed instead of the raw variables. Since a high correlation between some of the career indexes was expected, the covariation among the indexes was accounted for in the model by correlating the errors of these variables. The resulting model fitted the data well, chi-square with 10 *df* = 16.85; $p > 0.05$, NNFI = 0.99. After omitting several non-significant effects a model was obtained with a chi-square value of 34.59 with 27 *df*, $p > 0.10$, NNFI = 1.02. These values indicate that the final model fitted the data quite well.

Table III presents the standardized estimates for the final model. The pattern of effects of the explanatory variables were very similar for five out of the six mobility indexes. For example, sensation seekers were likely to experience both many positive (TnP) and many negative events (TnN), resulting in a career trajectory that contained significantly more transitions than the careers of others (TnT). Further, there was a positive effect of sensation seeking on the difference between the number of positive and the number of negative events (CPR), suggesting that sensation seekers experienced more upward mobility than others. Finally, sensation seekers experienced relatively uncommon events, as evidenced by the positive effect of sensation seeking on the uncommonness of the career (UNC). The other effects can be interpreted in a similar fashion.

Despite the strong similarity of the pattern of effects for TnT, TnP, TnN, CPR and UNC, it must be noted that there were also several important differences. For example, gender did not affect the number of negative events that occurred in a particular career trajectory, whereas we did find effects on the other four career variables. Also note that the strength of effects tends to vary across different mobility measures. Despite these differences, these five mobility indexes all seem to work in a similar way. This is probably due to the fact that positive events occurred far more frequently than negative events, leading the first to "overwhelm" the latter. It is likely that results would have been rather different, would the number of positive and negative events have been more equal.

For the sixth index (the Weighted mean Career Progression WCP), a very different pattern of effects was obtained. Most interestingly, whereas sensation seekers seemed to experience more upward career mobility than others, this effect disappeared when the uncommonness of the transitions was taken into account. Further,

Table III. Standardized Maximum Likelihood estimates for the final model

Variables	TnT	TnP	TnN	CPR	UNC	WCP
Sensation seeking[a]	0.13**	0.13**	0.08**	0.10**	0.14***	
Gender (hi = male)	−0.08*	−0.10*		−0.10*	−0.06*	−0.08*
Labor market experience	0.17***	0.11**	0.22***		0.22***	−0.16***
Level of education						0.12***
Level first job						−0.13***
Appointment type (hi = permanent)	−0.25***	−0.24***	−0.17***	−0.17***	−0.22***	
R^2	0.07	0.05	0.10	0.04	0.06	0.37

NB. TnT = total number of transitions, TnP = total number of positive transitions, TnN = total number of negative transitions, CPR = career progression, UNC = uncommonness career, WCP = weighted mean career progression.

[a] Latent variable, loading of Disinhibition was 0.64 ($p < 0.01$), loading of Boredom susceptibility was fixed for identification purposes.

we found effects of level of education and of the level of the first job that were not obtained for the other five indexes. Clearly, WCP measures a rather different concept than the other five indexes.

3. Discussion

The current paper dealt with ways to characterize the development of careers during a particular time interval. Previous approaches focused on either the occurrence of a particular event during this interval (event-centered methods; e.g., survival-analysis), or on the classification of careers as wholes (career-centered methods, such as clustering techniques). The indexes presented in this paper may be considered as lying halfway between these two approaches. They focus on the events that occur during a particular time interval, but this information is used to characterize the development of the career as a whole.

We distinguished among six indexes highlighting different aspects of the course of careers. Some of these emphasized the absolute amount of change that occurred during a particular time interval (frequency), whereas others focused on the amount of change, relative to other careers (uncommonness). Further, we distinguished between approaches that involved an evaluation of the nature of particular transitions, vs. approaches that treated all transitions equally. A small example in which all six indexes were applied was presented. This example revealed that the patterns of results obtained for these indexes may be quite similar, especially if particular transitions occur far more frequently than other events. It should be noted that despite such superficial empirical similarities, the theoretical meanings of the indexes presented here are completely different. That is, the choice for either of these indexes should be based on theoretical considerations.

In comparison to standard event-centered methods, the indexes presented here have the advantage that they can be applied to quantify the development of careers as a whole. That is, they do not focus on separate transitions, but rather on the career trajectories themselves. This implies that if one wishes to study careers rather than events, classical event-centered methods will be of less use than the methods presented here. However, if the focus is on the factors that determine the occurrence of one particular transition, traditional event-centered methods are more suitable than the approaches presented here.

The main drawback of traditional career-centered methods is that they typically result in a career classification that does not match the substantive research question very well. These approaches compare sequences of states occupied by the participants, and as long as sequences have enough in common they are grouped in the same category. Thus, what is obtained is a classification of more or less similar careers. Such a classification is often interesting in its own right, but substantive theory might lead researchers to examine rather specific career properties. In such cases, it seems better to focus directly on the properties one wants to study – amount of change in a career trajectory, uncommonness of careers, etc. – than to devize an exploratory typology of careers. Thus, contrary to standard career-centered methods, the indexes presented here are no one-approach-fits-all method. Rather, researchers must choose the mobility measure they want to use contingent on the substantive research question – which is desirable in itself, as this requires that one must consider the research question very well before analyzing the data.

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